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MARYLAND ENTOMOLOGIST

MARYLAND ENTOMOLOGICAL SOCIETY

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The purpose of the Maryland Entomological Society, which was formed in November, 1971, is to promote the science of entomology in all its branches, to provide a meeting place for professional and amatuer entomologists residing in Maryland, the District of Columbia, Virginia, Pennsylvania and Delaware, to issue a periodical and other publications dealing with entomology, and to facilitate the exchange of ideas and information through its meetings and publications.

Membership in the Society is open to all persons interested in the study of entomology. All members receive the Maryland Entomologist and monthly newsletters and/or announcements of meetings. Institutions may subscribe to the Maryland Entomologist but may not become members. Prospective members should send to the Treasurer full dues for the current year, together with their full name, address, telephone number, and special entomological interests.

Active members - annual dues $5.00
Junior members (under 18) - annual dues $3.00

Send remittances, payable to Maryland Entomological Society, and address changes to: Philip J. Kean, 1215 Stella Drive, Baltimore, Maryland 21207.

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Back issues of the Maryland Entomological Society Newsletter (Vols. 1,2,& 3 - 8 nos. each) and the Maryland Entomologist are available from the Treasurer. The M.E.S. Newsletters are .25¢ per no. and the Maryland Entomologist is $1.00 per copy.

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The Maryland Entomological Society is a non-profit, scientific organization. Meetings are held on the third Friday of every month (from October to May) at 8:00 p.m., in room 403 of the Biological Sciences Building, University of Maryland Baltimore County.

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Cover illustration: The logo of the Maryland Entomological Society features the Maryland Shield and a specimen of Euphydryas phaeton (Drury), the Baltimore Checkerspot, which became the official insect for the state of Maryland through the efforts of many of the members of this Society.

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CHECKLIST OF OFFICIAL STATE INSECT SYMBOLS

Compiled by John H. Fales

The following list of Official State Insect Symbols was taken from available brief magazine articles and other newspaper stories.

State	Insect
Arkansas	Honey Bee (Apis mellifera L.)
Maine	do.
Nebraska	do.
New Jersey	do.
Delaware	Ladybird Beetle
Massachusetts	do.
Ohio	do.
Oklahoma	do.
Pennsylvania	Firefly (Photinus pyralis Linne)
California	California Dog-face Butterfly (Zerene eurydice Bdv.)
Maryland	Baltimore Checkerspot Butterfly (Euphydryas phaeton (Drury)
Utah	Known as the Bee Hive State
Virginia	Has pending Praying Mantis or Tiger Swallowtail Butterfly
Kentucky	Tried unsuccessfully to get the Diana Fritillary (Speyeria diana Cramer) passed through legislature

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BOOK NOTICE

BIRDWING BUTTERFLIES OF THE WORLD. 1975. by B. D'Abrera. Lansdowne Press, Melbourne 3000 Australia. 260 pp. $49.50 *

This quarto size volume is a definitive monograph of the exotic Birdwing Butterflies. Thirty species and 120 subspecies are illustrated in actual size, in color. The photography is excellent. The 3 genera of birdwings - Ornithoptera, Trogonoptera and Troides occur in an area ranging from North India to the Solomon Islands. Whenever known, the early stages and food plants are described for the species or subspecies. This is a beautiful book and besides its technical value would enhance any library fortunate enough to be able to obtain a copy.

* Can be obtained from Entomological Reprint Specialists, P.O. Box 77224, Dockweiler Station, Los Angeles CA 90007.

THE NEED AND PRACTICALITY OF USING INSECTS AS A SOURCE OF FOOD

Richard C. Tippett

"What sort of insects do you rejoice in,
where you come from?" the gnat inquired.
"I don't rejoice in insects at all," Alice explained...

Lewis Carroll, Through the Looking Glass

Man is a creature of consciousness, and in so being he deviates from all other animal life in that he can and does manipulate the world about him. However, as a biological entity, composed of the most common of chemical substances, he does share the physiological need for food with other animals, plants and even the simplest of bacteria.

From this one basic need, man has created a myriad of sciences and social institutions that have become as much a part of man as the need itself.

Human nutrition is the study of man's relationship with his foods. Technically, it is a rather orderly and specific science, but when it is viewed from the aspect of what we choose to call food, it encompasses all the social, economic and psychological factors that govern the choice of what we offer ourselves and our fellow man in the way of nourishment.

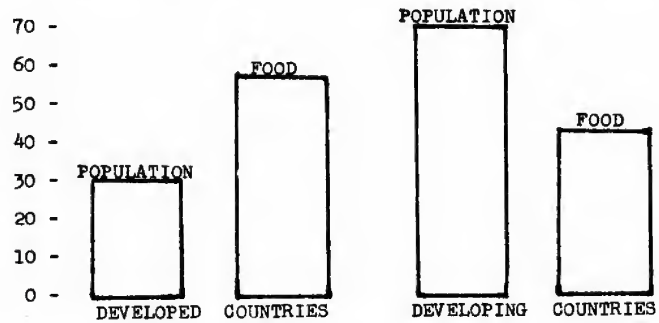
In The End of Affluence, Paul Ehrlich warns, "people in other parts of the world may (soon) face flood problems that are more immediate and severe than those we will confront, but Americans will soon be forced to make drastic changes in their eating habits."

The nations of the world seem to be divided into two basic groups, developed and developing. These groups can be made when their diet, rate of population growth and income are compared. In general, the countries which are offering adequate diets to their people are Europe and Russia, all of North America, Oceania (New Zealand, Australia, and the Pacific island archipelagos of Melanesia, Polynesia, and Micronesia) and the southern tips of Africa and South America. Israel and Japan are usually included in this group. The diet-deficient nations include the remainder of South America and Africa, all of Asia and Central America. (Arlin,1972).

Whereas, an intake of 2320 calories is considered marginal, the developing countries' daily per capita energy value is 900 calories less than the rest of the world. Per capita protein consumption in these countries is one third less, and the level of animal protein consumption is four fifths below that of developed nations.

Whereas, developed countries offer 30% of the world's population, they consume 57% of the world's food.

The disproportionate relationship between population and food supply can be more graphically portrayed in the following graph.



In 1963 the Food and Agriculture Organization of the United Nations concluded that 10 to 15 per cent of the world's population were undernourished and that up to 50% suffered from hunger, malnutrition, or both.

A staggering 300 million children in developing nations lack sufficient protein and calories.

The same FAO study estimated that by the year 2000, developing nations would require four times their 1960 supply of food and a 500 per cent increase in animal products. Even though food production has increased in recent years, the population of developing countries has increased exponentially.

As we become more aware of the problems that overpopulation can create, we will be forced to look for new and perhaps unconventional means of nourishment.

Research facilities are feverishly experimenting with alternative food sources. One of the more promising sources of protein is the meal that remains as a by-product of vegetable oil production. These oilseeds need only to be converted into forms palatable to the consumer.

Isolated Soy Proteins (ISP) can be processed and, with the addition of colors and flavors, formed into simulated beef, bacon, chicken and other meats.

FPC or fish protein concentrate is an essentially flavorless, odorless and concentrated (90%) source of protein. It may become a very desirable food additive.

Another high protein yield additive is single cell proteins (SCP). Certain types of bacteria and yeast can be rendered flavorless and odorless and added to other foods. However, proteins from these sources tend to be high in substances that may cause kidney stones and gout.

The cultivation of algae and other small plants is another source of food, but their food value is not as high as oilseed protein and their consumption must be limited to no more than 1/2 pound per day for fear of intestinal irritation.

Research has yielded a plethora of food substitutes, additives and alternatives, but one of the most abundant and easily manageable food sources are those "little beasties" usually referred to as pests - insects. There exists no real, scientific reason why insects cannot be rendered edible or eaten directly. History offers many precedents in this field.

Moses tells us in Leviticus 11:20-22, "The various winged insects that walk on all fours are loathsome for you. But of the various winged insects that walk on all fours you may eat those that have jointed legs for leaping on the ground; hence of these, you may eat the following: the various kinds of locusts, the various kinds of grasshoppers, the various kinds of katydids, and the various kinds of crickets."

The Jewish Talmud refers to many instances when at least some insects can be offered as food. Ironically, the Old Testament specifically forbids the ingestion of clams, shrimp, crabs, lobsters, and many other marine forms. "Every water creature that lacks fins or scales is loathsome for you, (Leviticus 11:12)." Admittedly, not all of the "Holy" word can be taken at face value.

Archeological evidence has produced some information regarding the inclusion of insects in the daily diet of some primitive people. Since early man "acted on the principle that he should avail himself of everything edible, he consumed the myriads of insects, adults and larvae, winged and terrestrial, which are never far from human habitation." (Brothwell, 1969)

Stone Age evidence reveals an illustration of a honey-hunting scene on the wall of a cave in Arana, Spain. A lone fragment from the Magdalenian site of Les Trois Freres, in southern France, is decorated with a grasshopper. (Brothwell, 1969).

A contemporary of the Roman Emperor Marcus Aurelius, Athenaens, reports that the common grasshopper and the monkey-grasshopper were served as appetizers in many homes of Greek society. Aristophanes relates that Greeks sold grasshoppers in the market and were apt to grind them up and make flour of them. (Taylor, 1975).

Pliny, a citizen of the first century A.D., records the fact that the Parthians ate locusts and some evidence is supposed to support the fact that King Solomon fed his wives grasshoppers to keep them healthy and alert. (Taylor, 1975).

The ancient evidence continues to grow, but what of eating habits of today. Whereas, the Western world has a particular disdain for these remarkable creatures, the rest of the world offers them due respect.

In Australia, the larvae of a number of species of moth, particularly those of the genus Cossus, are eaten by the Aborigines with great gusto. They are white, 1 to 1.5 decimeters in length and are found

among acacia roots.

A certain group of Pygmies in Africa collect, cook and eat certain varieties of termites and colonial caterpillars. Since termites nest in the same place each year, the Pygmies stake out certain hills and wait until the termites are ready to swarm. The entire village may participate in this hunt for several days. Before the swarm takes place, each family sets up a windscreen and a roof of leaves over a particular hill. Trenches are then dug around this device. A fire is built near the hill with a hole in between. At dusk the termites begin to swarm or fly. The roof acts as a trap; they fall to the ground, crawl toward the fire and fall in the hole. The women scoop them up into baskets and prepare them by roasting, boiling or pounding them into a paste. The termites are also eaten alive. (Coon, 1971).

The stories continue and do not only confine themselves to Eastern or African cultures. American Indians also enjoyed the benefits of the so-called Mormon crickets.

The insect has been unduly criticized and scorned. General abhorance of any six-legged creature seems matter of fact, but in fact, we owe much to these little invertebrates.

Insects are unquestionably one of man's greatest benefactors. Estimates of the number of species range from two to ten million, with the majority being beneficial. Insects are the instruments of pollination for innumerable flowers, fruits and vegetables and serve as an important link in the cyclic transfer of energy in countless food chains. Why not carry their benefits one step further and include them as one of our food staples?

Insects are closely related to the crab, lobster and shrimp. We consider many invertebrates as delicacies--scallops, clams, oysters, etc. Yet when it comes to insects we "draw the line." If we can place the lobster in such high esteem, why not the insect? The lobster eats every kind of putrid flesh and fish it can find. Oysters filter all types of organic matter from sea water and crabs scavenge the ocean floor.

The point is, people will eat these seemingly offendable creatures and refuse to eat insects, some of the cleanest animals on the face of the earth. A caterpillar or grasshopper will eat nothing but clean, green, plant material the entire extent of its life. (Taylor, 1975).

The fact is that we eat or at least have eaten insects many times over in our own lives. We have done this indirectly and directly.

Indirectly, we have all consumed some honey in our lives. Honey is a derivitive of nectar, which the bee collects, concentrates and stores in wax.

Various food stuffs, such as freshwater fish and gamebirds, contain insect nutrients in their meat by way of their consumption of these creatures in their diet.

Unknowingly, however, we ingest some insects directly almost every day of our lives. The lettuce we place in our salads, invariably contains aphids, that a gentle stream of water will not dislodge.

A small joke usually follows such knowledge--"You don't pay extra for the meat!" But what an added bonus of unexpected protein.

Even the Food and Drug Administration prescribes limits for insect infestation and damage in our foods. A complete list can be obtained by writing to the Department of Health, Education and Welfare, Public Health Service, Food and Drug Administration, Rockville, Md. 20852

Following is a sampling of their limits.

Coffee beans	10% by count insect infested or insect damaged
Cherries, fresh, canned, or frozen	4% by count insect infested
Olives, salt cured	15% by count with 10 scale insects each
Apple butter	5 insects or insect parts (not counting mites, aphids, thrips, scales) per 100g
Peanut butter	50 insect fragments per 100g
Tomatoes, canned	10 fruit fly eggs per 500g or 5 fruit fly eggs and 1 larva per 500g or 2 larvae per 500g

Robert Choate once said, "there are more proteins in the insects in dry cereals than in the food itself."

In a world where the ever increasing need for protein is more apparent everyday, a logical source of such a nutrient could be insects.

Whereas, most plant materials lack one or two essential amino acids, most animal protein contains the ten essential amino acids humans require in their diet. In addition, animals contain a greater percentage of protein because of their lower water content, a fact which allows man to consume a smaller quantity for the same food value. Iron is also in higher quantities in animal meat. (Taylor, 1975).

The nutritional needs of man are vitamins, minerals, carbohydrates, fats and the most essential, protein.

Data shows that many insects have a protein content at least as great as that of beef and in some cases several times greater. For example, one living termite is 23.2% protein and 28.3% fat, (Bodenheimer, 1951) whereas, proportionally, raw beef is 18.4% protein and 20.1% fat. (Watt, 1963).

The data also relates that many insects are high in minerals, salts and vitamins (A. B_1 B_2 D). (Uvarov, 1966).

The exoskeleton of insects, being indigestible, may represent only 4% of the total mass of the insect. This would pass through the human digestive tract much like the indigestible cellulose portions of plants.

Keeping in mind that the rate of conversion of food into body mass is high in most insects, we can see their promise as a source of human food. For example, some Hemiptera species convert between 19% and 54% of their food into tissue, whereas, beef cattle and hogs convert only approximately 10 - 20% of their food intake into animal tissue. (Waldbauer, 1968).

Capacity for reproduction is not an unknown fact of insect physiology. It has been estimated that one pair of house flies, if allowed to reproduce without external controls would produce descendents numbering 191,000,000,000,000,000,000 or 191 quintrillion in one season, April to August.

Tribolium castaneum, a flour beetle, can easily produce 2,000 eggs in her lifetime. If one half of these are female and considering a generation takes one month to develop, it is possible that after two years there would be almost as many beetles as there are electrons estimated for the visible universe. (Taylor, 1975).

The normal reproductive capacity of insects is, however, constantly checked by natural balances, but imagine the possibilities of controlled mass production of selected species. The food source is unimagineable.

Of course, further study and practical plans of application must first be developed before any positive use of the insect world can be utilized as a human food source. But, in an era when the normal food sources of a burgeoning world population are being taxed beyond their reasonable limits, any legitimate alternative must be researched and seriously considered as a possible solution.

Perhaps science can reasonably answer Ogden Nash when he wrote:

"God in His wisdom
Made the fly
And then forgot
To tell us why."

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MARYLAND RECORDS OF LEPIDOPTERA TAKEN IN A BAIT TRAP

Robert S. Bryant

The use of bait for attracting many species of butterflies and moths is not new, having been practiced since before the turn of the century. Baiting or "sugaring", as it came to be called, is still practiced today and consists of applying a mixture of crushed fruit, sugar and beer, in patches, to the trunks of trees, usually along a country road bordering a woods. This proceedure has several drawbacks, the main ones being that it is very confining and time consuming for the collector and many specimens are lost either because they do not stay long enough or are scared away as the collector approaches. However, recent refinements of this technique, in the form of various types of traps, have freed the collector to attend to other matters and considerably reduced the percentage of specimens that escape. No longer must the collector spend long hours patrolling one or two areas stealthily stalking skittish specimens, but instead, many traps may be hung out over a large area and harvested as little as twice in a 24 hour period.

Since I have been using bait traps for more than ten years, I thought a list of the species taken, thus far in Maryland, might be of some interest. It will be immediately noticed from the list of species that only members of a few families are attracted to baits of rotted fruit.

BUTTERFLIES

Nymphalidae:

Asterocampa celtis (Bdv.& LeC.)
Asterocampa clyton (Bdv.& LeC.)
Limenitis astyanax (Fabr.)
Limenitis archippus (Cram.)
Vanessa atalanta (L.)
Nymphalis antiopa (L.)
Polygonia interrogationis (Fabr.)
Polygonia comma (Harris)

Satyridae:

Lethe portlandia anthedon (Clark)
Lethe eurydice appalachia (Cherm.)
Euptychia cymela (Cram.)
Cercyonis alope (Fabr.)
& form carolina (Cherm.& Cherm.)

MOTHS

Sphingidae:

Darapsa myron (Cram.)
Darapsa pholus (Cram.)
Sphecodina abbottii (Swains.)
Deidamia inscriptum (Harr.)
Amphion nessus (Cram.)

Noctuidae:

Peridroma saucia (Hbn.)
Graphiphora c-nigrum (Linn.)
Lacinipolia renigera (Steph.)
Leucania unipuncta (Haw.)
Metaxaglaea inulta (Grt.)
Eupsilia sidus (Gn.)
Rusina bicolorago (Gn.)
Dipterygia scabriuscula (L.)
Platysenta vecors (Gn.)
Xanthoptera nigrofimbria (Gn.)
Erastria carneola (Gn.)
Neoerastria apicosa (Haw.)
Catocala piatrix (Grt.)
Catocala muliercula (Gn.)
Catocala flebilis (Grt.)
Catocala vidua (A.& S.)
Catocala maestosa (Hlst.)
Catocala paleogama (Gn.)
Catocala neogama (A.& S.)
Catocala ilia (Cram.)
Catocala parta (Gn.)
Catocala cara (Gn.)
Catocala concumbens (Wlk.)
Catocala amatrix (Hbn.)
Catocala ultronia (Hbn.)
Catocala grynea (Cram.)
Catocala amica (Hbn.)
Euparthenos nubilis (Hbn.)

Noctuidae: (continued)

Parallelia smithi (Gn.)
Parallelia bistriaris (Hbn.)
Mocis texana (Morr.)
Celiptera frustulum (Gn.)
Zale lunata (Dru.)
Zale unilineata (Grt.)
Zale galbanata (Morr.)
Zale undularis (Dru.)
Zale minerea (Gn.)
Zale horrida (Hbn.)
Anticarsia gemmatilis (Hbn.)
Strenoloma lunilinea (Grt.)
Scoliopteryx libatrix (L.)
Anomis commoda
Camptylochila americalis (Gn.)
Camptylochila aemula (Hbn.)
Camptylochila lubricalis (Geyer)
Zanclognatha lituralis (Hbn.)
Bleptina caradrinalis (Gn.)
Dercetis vitrea (Grt.)

Thyatiridae:

Habrosyne scripta (Gosse.)
Pseudothyatira cymatophoroides (Gn.)
& form expultrix (Grt.)

Geometridae:

Coryphista meadi (Pack.)
Eupithecia sp
Horisme intestinata (Gn.)
Lygris diversilineata (Hbn.)
Percnoptilota obstipata (Fabr.)
Melanolophia canadaria (Gn.)
Euchlaena effecta (Wlk.)
Euchlaena amoenaria (Gn.)
Campaea perlata (Gn.)

Pyralidae:

Desmia funeralis (Hbn.)
Pyralis farinalis (Linn.)
Herculia olinalis (Gn.)

Aegeriidae sp.

There is room for a great deal of experimentation in regard to other types of bait to determine just what might be attractive to other families of butterflies or moths. Papilios, for example, are never attracted to rotted fruit, but might easily come to a bait consisting of essence of heliotrope, lilac, mimosa, clover or even wet mud. Hairstreaks would almost certainly come to essence of dogbane. Carrion, dung or urine should attract a few other species of butterflies and moths. Most of the sphingids should be attracted to essence of petunia, honeysuckle, morning glory or trumpet vine.

It is hoped that some clever lepidopterist, who also has a knowledge of chemistry, will put his talents to work on this project so that we all might benefit.

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THE 1976 FIELD TRIP OF THE MARYLAND ENTOMOLOGICAL SOCIETY

Philip J. Kean

The M.E.S. annual field trip for 1975-1976, was conducted on Saturday, June 26, 1976 and took the participating members on a foray through the State's southernmost counties on the western shore of the Chesapeake Bay. Dr. William A. Andersen, the society's president, was our tour guide on this venture into Charles and Saint Mary's counties. We began this adventure by meeting at Waldorf, Md. at the Suburban Trust Bank on U.S. 301 early that morning. Among the early arrivals were Dr. Andersen, Richard Smith, Dick Tippett, Bob Bryant and myself. As we sat around and "chewed the fat," several stragglers showed up. They included Mrs. Elfrieda Haynes, Stephen Haynes, and Kathy Boyd and Debbie Waller who arrived in a rather official looking truck belonging to the Smithsonian Institution in Washington, D.C.

After deciding that everybody who would be coming had already arrived, we struck out in the direction of Md. route 5 and the road to Lexington Park. Feeling bold and adventurous that day, Bob Bryant and I took the lead car and while everyone else proceeded to turn left at the

next intersection, we were heading merrily south on U.S. 301 and on to oblivion. Discovering our error some ten miles later, we quickly made a U-turn and got back on the right track in an attempt to catch up with the rest of the pack.

We knew that the first scheduled stop was a rather shabby looking backwoods bar just inside the Saint Mary's county line, near the town of Oaks. What neither Bob nor I knew was where to find the place. Needless to say, we missed the collecting stop at Oaks, and, for lack of a better plan of action, we decided to go on to our next scheduled rendezvous point which was the Patuxent Naval Air Training Center. There we would wait for the rest of our party and "eat our hearts out" over their haul at Oaks.

About half an hour later, the rest of the gang rolled in with their catch. Among the species collected at Oaks were Automeris io (Fabricius), a large female Hyalophora cecropia (Linnaeus) and a variety of small moths including the rather pretty Megalopyge opercularis (Abbott & Smith).

While we all awaited the arrival of Jonathan and Mrs. Coletta Halicak, who were to be our guides for our tour of the N.A.T.C. grounds, Bob Bryant managed to sweet-talk the female H. cecropia away from its original collector. As the specimen hadn't as yet been cyanided, he kept it alive and later used it to obtain breeding stock. Even with that, we still felt a little disappointed about missing the collecting at Oaks. Just about that time, Jon and Mrs. Haliscak arrived along with two members of the N.A.T.C. Department of Environmental Services. With that, we were on the road again through the grounds of the Patuxent N.A.T.C. It was here that we did our most extensive collecting of the day. The following list represents the combined capture and/or confirmed sighting records for this segment of our trip:

Hesperiidae:

Atalopedes campestris (Bdv.)
Polites coras (Cram.)
Ancyloxypha numitor (Fabr.)
Nastra lherminier (Latr.)
Pholisora catullus (Fabr.)
Erynnis horatius (Scud.& Bur.)
Epargyreus clarus (Cram.)

Papilionidae:

Papilio glaucus (L.)
Papilio troilus (L.)

Pieridae:

Pieris rapae (L.)
Colias eurytheme (Bdv.)
Colias philodice (Gdt.)

Lycaenidae:

Strymon melinus (Hbn.)
Strymon titus mopsus (Hbn.)
Everes comyntas (Gdt.)
Lycaenopsis argiolus pseudargiolus (Bdv.& LeC.)

Nymphalidae:

Limenitis archippus (Cram.)
Cynthia virginiensis (Dru.)
Junonia coenia (Hbn.)
Phyciodes tharos (Dru.)
Speyeria cybele (Fabr.)

Danaidae:

Danaus plexippus (L.)

Satyridae:

Euptychia cymela (Cram.)
Cercyonis pegala pegala (Fabr.)
Cercyonis pegala alope (Fabr.

Aside from the butterflies collected at the N.A.T.C., we also collected a few moths on the dogbanes which were in bloom. Haploa colona (Hubner), in both its typical form and its subspecific form conscita (Walker), were collected as well as Euchaetias oregonensis (Stretch).

Kathy Boyd and Debbie Waller were also collecting a variety of insects for the Smithsonian's Insect Zoo. Collecting in the vast dogbane patches in the area yielded a rich harvest of the pretty dogbane beetles (family Chrysomelidae), milkweed beetles, milkweed bugs (both Lygaeus kalmii and Oncopeltus fasciatus), and a few ambush bugs. Also netted were a large number of dragonflies (order Odonata), and I even managed to scare up a specimen of the black tiger beetle Cicindela punctulata (Olivier) on one of the sandy paths through the fields. Eventually, everyone joined the Smithsonian delegation in collecting practically anything that moved. I even went so far as to pick up an unfortunate box turtle that had fallen into the N.A.T.C. sewage treatment

plant. Fortunately for me, the sedimentation chamber which had become its prison was empty at the time. All the same, no one seemed to want the turtle after its last known whereabouts were disclosed, so I released the poor fellow to return to the woods from whence he came.

At this point, we said "so-long" to the Haliscaks and the Hayneses while the balance of our party continued the trek through nearby Lexington Park and on to the vicinity of the Chaptico River. As it was a hot day and we had been doing some hard collecting up to this point, we decided to make a quick stop at the friendly Lexington Park Seven-Eleven Store. This store is evidently one of those 24 hour operations that never turns off its display lighting for, as we stood around drinking some cold sodas, one of our party suddenly blurted out "Hey, look up there!" Clinging to the wall by the lights, sitting pretty just for the taking, were a greater array of small moths than were in evidence at Oaks. Everything seemed to happen at once after that. We all went scampering back to our cars to retrieve our nets, killing jars and other paraphernalia and proceeded, much to the amusement of the clerk and the patrons, to climb, jump and stand on each others shoulders and collect the specimens hanging all over the walls of the store. Since the collecting was so profitable at this spot, the next thing we proceeded to do, this time to the complete and utter dismay of the clerk and patrons, was to go INSIDE the store and pick off the moths that had worked their way into the building. Dick Tippett even surprised us by climbing up on the ice machine in order to retrieve a beautiful specimen of Automeris io that had landed behind the machine and was visible from outside the store. Some of the more notable captures made at the 7-11 were a large Catocala ilia form conspicua (Worthington), Estigmene acrea (Drury), a rather pretty Nepytia sp., several more Megalopyge opercularis, Ianassa lignicolor (Walker), Lagoa crispata (Packard), Euthisanotia grata (Fabricius), Artace punctistriga (Walker) and Fentonia marthesia (Cramer). Although no damage was done by our group to the store, I don't think that poor girl behind the counter will ever be the same again.

From the 7-11, it was on to the marshes of the Chaptico River in western Saint Mary's county. On the long drive to Maddox, the nearest township to our proposed collecting site, Kathy and Debbie seemed to be having some trouble keeping up with the rest of us, but somehow, we all managed to stay together. Just as we turned off the main highway we made our first sighting of the zebra swallowtail, Graphium marcellus (Cramer). Unfortunately, he was a little too quick for us and darted into the bushes by the side of the road before anyone could land a net over him.

It was well past noon by the time we reached the Chaptico marshes. We were all told by Dr. Andersen to keep our eyes peeled for specimens of Poanes viator (Edwards), the salt marsh skipper, as he had collected this decidedly local species in this area before. Just as the good doctor had said, several viator were sighted as we proceeded through the tall grass beside the river. Although everyone else seemed to be able to land a specimen of viator, I was having my share of trouble trying to get one in the tall grass down by the river. I was just about to give up and rejoin Dr. Andersen on his way back to the roadside when I spotted a choice specimen of viator flying in an open area of the marsh. I then quickly sneaked up on it and, to the incredulous looks of a couple of local fishermen, blithly swept it into my net and quickly dispatched it into my killing jar. It was a real thrill for me to make this capture as it was my first specimen of this species. Beside P. viator, several other butterflies were collected at this site. Among them were Erynnis horatius, Atalopedes campestris, Strymon melinus and Atrytone delaware (Edwards).

Our last stop was Port Tobacco in Charles County. Here we stopped to collect in a large field of blooming dogbane. There were a large number of butterflies flying around feeding on the nectarous flowers of the dogbane, however, they only represented a few species. We did find Graphium marcellus to be quite common in this location, and everyone treated himself to one or two specimens. I collected several rather ragged females in an attempt to rear them. I am sorry to report that I didn't have any success in this endeavor. Again, the Colias species were in great abundance as were additional specimens of Atalopedes campestris. Other species which were collected are Danaus plexippus, Junonia coenia, Cynthia virginiensis and Phyciodes tharos.

This last site brought an end to a long and tiring day. Although we were all exhausted, we were all still in good spirits as the collecting had been pretty good. Despite the fact that we didn't collect many

rare and unusual species, we still managed to have a grand time and I, for one, am looking forward to next year's collecting trip with great expectations. I hope to see you there too!

Acknowledgements

I should like to take this opportunity to thank Mr. Robert S. Bryant, Mr. Richard H. Smith,Jr. and Dr. William A. Andersen of the Maryland Entomological Society for contributing material used toward the publication of this article. I would also like to extend a special thank-you to Mr. Robert S. Bryant for providing me with the identifications of the many small moths cited in this article.

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AN OBSERVATION ON HILLTOPPING BY BUTTERFLIES IN MARYLAND

John H. Fales

Hilltopping is the term applied to the flight behavior of insects when various species often congregate in numbers on the summits of hills, ridges, peaks and mountains. This behavior in butterflies has been discussed in detail by Oakley Shields (J. Res. Lepid. (1967) 6(2): 69-178). An observation in Southern Maryland of hilltopping by butterflies is reported here.

The morning of October 17, 1972 at Plum Point in Calvert County was cloudy but mild. The afternoon became clear with a high temperature of 80° F., and WNW wind of 10 knots. At 1:30 PM EST the writer collected along a ridge parallel to the western shore of the Chesapeake Bay and 230 yards inland, where peach orchards extended downward on both sides of the open ridge area.

About 50 monarch butterflies Danaus plexippus plexippus (Linnaeus) were seen in a small unmowed area about 75 by 150 feet between the ridge and peach orchard toward the water, where Aster ericoides (Linnaeus) and Solidago sp. were blooming profusely. While photographing the monarchs in the dense growth many butterflies of various species were noted. After 30 minutes, 15 species were collected. It was then realized that this was an example of butterfly hilltopping.

In addition to the monarch, the species collected were Atalopedes campestris (Boisduval), Hylephila phyleus (Drury), Lerema accius (Smith), Erynnis horatius (Scudder & Burgess), Pieris rapae (Linnaeus), Colias eurytheme eurytheme (Boisduval), Colias philodice philodice (Godart), Libytheana bachmanii bachmanii (Kirtland), Vanessa atalanta rubria (Fruhstorfer), Cynthia virginiensis (Drury), Junonia coenia coenia (Hubner), Polygonia interrogationis (Fabricius), Polygonia comma (Harris), and Phyciodes tharos tharos (Drury). Also seen were Battus philenor philenor (Linnaeus), Phoebis sennae eubule (Linnaeus), and Cynthia cardui (Linnaeus) bringing to 18 the number of species that were present on this ridge on this pleasant afternoon. The insects were mostly in fresh condition, and both sexes were noted for most species. E. horatius and L. b. bachmanii probably represented an additional partial brood since these collections were very much later than previous occurrences. An estimated 500 D. p. plexippus were observed feeding on Aster ericoides in the adjacent area closer to the water.

Shields (1967) concluded that female butterflies instinctively seek a topographic summit to mate. He disagreed with the theory that winds and updrafts caused butterflies to concentrate on summits.

It is suggested that collectors be on the alert for other examples of hilltopping.

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MORE RECORDS OF HEMILEUCA MAIA (DRURY) IN MARYLAND

Robert S. Bryant

After reading the article by John Fales in the February 1977 issue of Maryland Entomologist concerning buck moths in Maryland, it occurred to me that some additional observations and records might be of interest.

Other published accounts on the flights of buck moths, almost without exception, mention that they are active in the hours before noon and this activity declines rapidly soon after noon but no reasons or theories are proposed to explain this behavior. Several consecutive years of observing and collecting this species in the field, and observing several broods of reared specimens enables me to make the following comments.

While it is true that the peak hours of activity are in the late morning, occasional specimens may be seen on the wing as late as 3:00 p.m., as stated by Mr. Fales. However, what he and others have failed to mention, is that these specimens are always males. The female flight period is in the late afternoon. Male pupae hatch early in the morning and the moths begin to fly around 10:00 a.m. Female pupae hatch a few hours later but do not fly until after they have mated. Shortly after noon the females begin to "transmit", which accounts for the sudden decline in the number of males on the wing. With maia, as with Automeris io (Fabricius), the mating process is abbreviated, seldom lasting more than an hour. Females take to the wing sometime after 3:00 p.m. and, after a short flight to a suitable oviposition site, begin to lay their eggs in neat rings around oak twigs. At the location where I made most of my observations, the type of oak utilized seems to be a form of black oak, Quercus velutina (Lam.). Unfortunately, oaks tend to hybridize, making reliable identification difficult.

In October 1967 I encountered an enormous flight of maia near Reese, in Carroll County. Having arrived about 11:00 a.m. I found myself in the midst of one of the most incredible and exciting experiences that I have had in entomology. Exciting because I had never before had the opportunity of collecting maia in quantity, and incredible because there were, at least, six specimens in view at all times for nearly two hours. At this particular site there are two sections of oak woods separated by a grassy valley approximately 600 feet wide. The males were patrolling the edges of both sections of woods, seldom penetrating very far into the woods and almost never crossing the grassy valley between.

The males, as has been stated by many authors, are difficult to catch. They have the uncanny ability to zig when you would swear they were going to zag. Due to the hilly terrain, overhanging branches, patches of brambles, and the moth's natural ability to maneuver in a completely unorthodox manner, accumulating a decent series of specimens proved to be more "sport" than I was used to.

While taking a breather I noticed that the moths followed the tree line, almost exactly, along the edge of the woods until they came to a tree that was out of line with the rest. This tree formed an obstruction in their path which they handled by going around it on the open side. My problem was solved. By taking up a position at the point where the tree protruded, and taking advantage of the fact that virtually every moth was forced to come right by me, I was able to take a swing at each one as it passed. In this manner I managed to net one out of every three specimens at a considerable saving of time and energy and far less peril to life and limb. When one got by me I simply waited for the next.

Within half an hour I had collected a series of 16 males and decided not to be greedy. Since I owned the land, I felt I could return in succeeding years and collect a few more. Unfortunately, this was an error in judgement. A wise lepidopterist once told me, "when a species is common, collect as many as you will ever need because you will probably never see them so numerous again."

During the winter of 1967-68 I returned to the area to look for over-wintering egg rings. What better place to look than where the moths had been so numerous in the fall? I managed to collect 3 rings and located several others. On another trip to the area in June 1968, after the larvae had hatched, I spotted 11 colonies of over 100 larvae each. A month later, in July, after the larvae had passed the third instar and left the trees, it was practically impossible to take more than a few steps without the risk of crushing one or more under foot. When the

third week of October finally arrived, I returned to the area fully expecting to acquire another nice series of specimens.

The noonday air, which should have been filled with the hundreds of moths that should have issued from all the larvae I had seen several months before, was depressingly still. Only a few specimens were sighted during the peak hours and one was finally captured after a breakneck chase down hill. Subsequent trips during the next week proved even less fruitful, so I concluded they must have emerged earlier than normal. A search for egg rings during the winter of 1968-69 turned up nothing.

After the trees leafed out a few months later, a more thorough search was conducted and three colonies of larvae finally located. However, it was not until July when I returned to collect some of the nearly mature larvae, that I discovered the reason for the declining maia population. Flies!! Thousands and thousands of Tachinid flies. They were on practically every leaf and every blade of grass, and the sound of those that were disturbed into flight as I walked along was like being under high tension power lines. The few maia larvae I managed to find all had numerous unhatched fly eggs on their backs and even though I removed every egg, none of the larvae pupated. Collecting trips at the appropriate time in October turned up not a single specimen and a search for egg rings during the winter of 1969-70 was likewise fruitless. Nor have I been able to discover even a vestigial remnant of the once great population at Reese in the ensuing years. I thought perhaps, due to the fact that a small percentage of maia pupae do not hatch until the second year, they might be able to maintain the colony in spite of the devastating effects of the parasites but apparently such was not the case.

It may be worth mentioning that two of the specimens from the Reese population are very close to ab. lintneri (Ckll.), a form reportedly found only in the Pine Bush country near Albany, New York. Lintneri is a rare form in which the forewings are all black and the white band on the hindwings is much reduced.

More Maryland Buck Moth Records

1966	October 22
1967	October 11*, 12*, 20(3), 21(18), 22, 24(5), 26*, 27*, 28(3*) November 5*
1968	October 16*, 18*, 20, 27*
1969	October 2*, 3*
1974	October 28 (ex larva from near Salisbury, Md., Wicomico Co.)

(all records from Reese, Md., Carroll Co. except last entry)

*- ex ova or ex larva

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Ed. note: The article on page 10, by John Fales, graphically illustrates the kind of keen observation that is needed to help understand the activities and life histories of Maryland's insects. Every collector has the opportunity to contribute to this knowledge by making his observations known. It is hoped that other MES members will follow Mr. Fales' lead.

The Maryland Entomologist is published irregularly by the Maryland Entomological Society. Original articles on geographic and temporal distribution, particularly pertaining to Maryland and adjacent states, ecology, biology, morphology, genetics, systematics, behavior, etc. are welcome. Book notices and reviews, news of the members, requests for information, notes on distribution, occurrence, migration and others will be published. All articles are subject to editorial review and acceptance. They should be sent to Robert S. Bryant, 522 Old Orchard Road, Baltimore, Maryland 21229.

This publication will reflect the interests, views, and talents of the entire membership. It will be viable as long as everyone views his contributions as necessary and meaningful for its continuance.

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Contributors should prepare manuscripts according to the following instructions.

Text: Manuscripts submitted for publication in the Maryland Entomologist must be typewritten, entirely double-spaced, on one side only of 8½ X 11 inch typing paper. The first mention of a plant or animal in the text should include the full scientific name, with authors of zoological names. Underline only where italics are intended.

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Villiard, P., 1964. Multicolored World of Caterpillars. Natural History Vol.LXXIII No.4 p.24-31

_____. 1969. Moths and How to Rear Them. Funk & Wagnalls, New York. 235pp.

Additional references that may be helpful to the reader should be listed under the heading SELECTED REFERENCES, in the above manner.

Tables: Tables, graphs and line drawings should be done with indelible, black ink and should be placed on separate sheets, following the main text, with the approximate desired position indicated in the text.

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